



ECS DAAC LAN Architecture

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Overview



- **Driving Requirements**
- **Sizing Approach**
- **Release B DAAC LAN Architecture**
- **IP Addressing and Routing**
- **Network Security**
- **Failure/Recovery**
- **COTS Selections**

Presentation uses GSFC, and JPL DAACs to illustrate design features; DAAC-unique designs will be presented later today (also in section 3.4.1 of DAAC-unique 305 volumes)



Driving Requirements

Separation of Push and Pull Flows

- Do not want user pull to interfere with production flows
- Example: heavy user interest in data relating to a catastrophic event

Very large data flows at some DAACs (GSFC, LaRC, and EDC)

- Some flows far exceed FDDI capability
- These flows are between Data Server and Processing subsystems

RMA

- Networks need to contribute to RMA requirements as allocated to strings of functions

Security

- Security is implemented using filtering on the network level (higher level applications will use DCE's security features)

Scalability

- Network should accommodate growth with minimum breakage

Driving Requirements



Evolvability

- EOSD 5070; ECS shall enable expansion to GByte networks

Management

- Network should be manageable

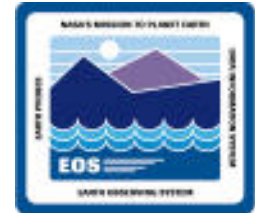
Sizing Approach



Sources for sizing

- **Static analysis of the February 1996 AHWGP baseline**
 - production network, DAAC-to-DAAC flows (includes subsetting)
- **February 1996 technical baseline - 1x electronic distribution**
 - user network

Examples: GSFC (large DAAC) and JPL (small DAAC)



Sizing Approach

Major Release B Data Flows for GSFC DAAC

Major Data Flow Description *	Raw Volume (in Mbps)	Factors Applied	Weighted Volume (in Mbps)
Ingest to Working Storage Server	6.5	2,3,4,5,6	18.2
Working Storage Server to Processing	257.6	1,4,5,6,7,8	584.8
Working Storage Server to/from FSMS Server	408.8	1,4,5,6,7,8	928.0
Working Storage Server to Distribution Server	38.7	2,3,4,5	108.8
Working Storage Server to/from DAO Processing	13.6	2,3,4,5,6	38.2
ACM Server to/from other DAACs (includes TSDIS)	17.0	1,2,3,4,5,6	57.5
User Pull	34.4	2,3,4,5	96.7

Overhead Factors

1. SSI&T : 1.2
2. FDDI & TCP/IP Protocol Overhead: 1.25
3. FDDI Circuit Utilization: 1.25
4. Avg.-to-Peak Conversion: 1.5
5. Scheduling Contingency: 1.2
6. Operational Hours Factor: 1.0
7. HiPPI Protocol Overhead: 1.05
8. HiPPI Circuit Utilization: 1.0

- Other flows (< 2 Mbps) include events, subscriptions, request tracking, sessions and SNMP

Sizing Approach



Major RB Data Flows for JPL DAAC

Major Data Flow Description *	Raw Volume (in Mbps)	Factors Applied	Weighted Volume (in Mbps)
FSMS Server to Processing	2.5	1,2,3,4,5,6	35.5
FSMS Server to Distribution Server	14.4	2,3,4,5	40.5
ACM Server to/from other DAACs	< 0.1	1,2,3,4,5,6	0.1
User Pull	1.3	2,3,4,5	3.7

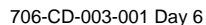
Overhead Factors

1. SSI&T : 1.2
2. FDDI & TCP/IP Protocol Overhead: 1.25
3. FDDI Circuit Utilization: 1.25
4. Avg.-to-Peak Conversion: 1.5
5. Scheduling Contingency: 1.2
6. Operational Hours Factor: 4.2
7. HiPPI Protocol Overhead: 1.05
8. HiPPI Circuit Utilization: 1.0

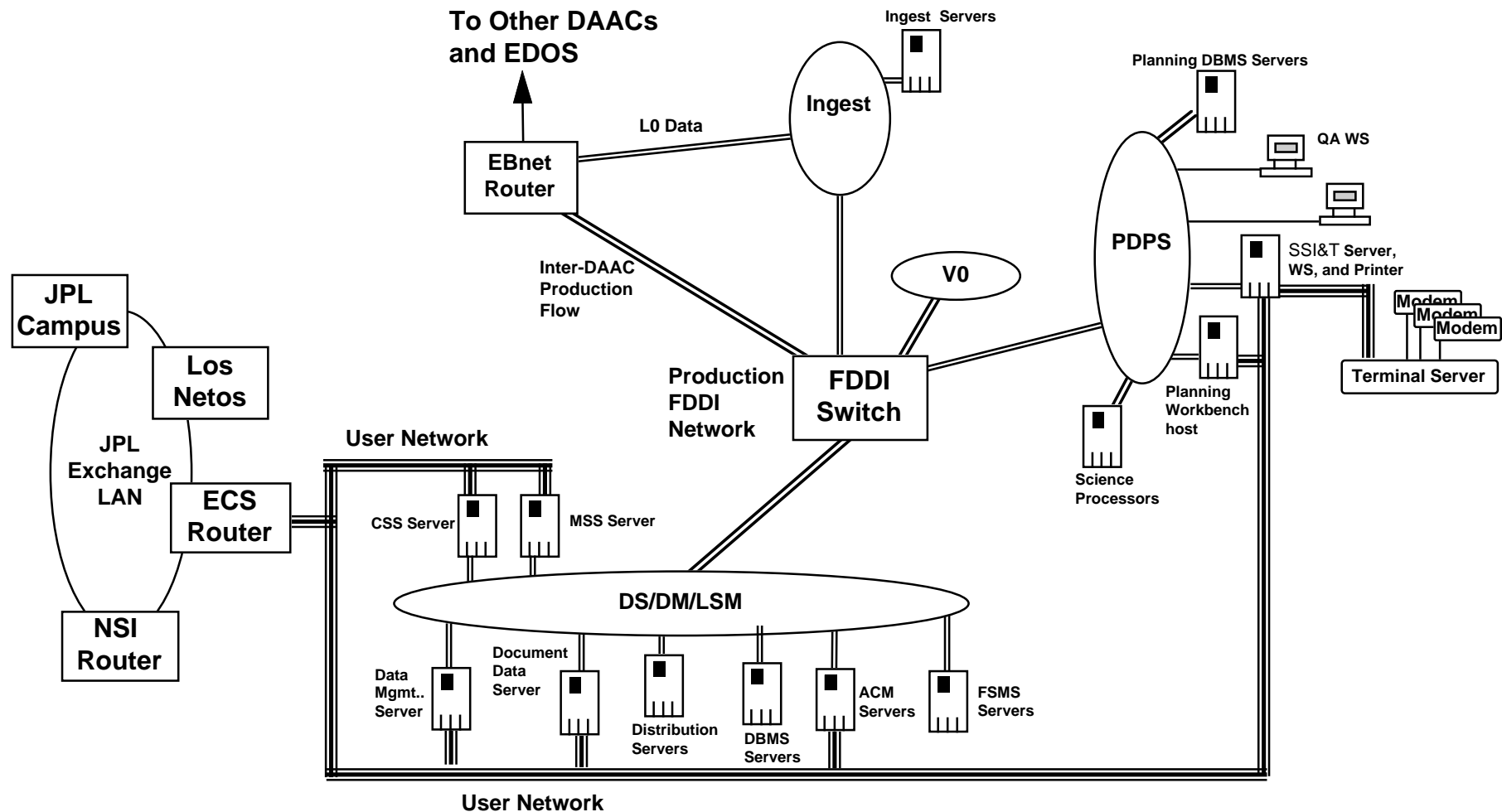
- Other flows (< 1 Mbps) include events, subscriptions, request tracking, sessions and SNMP

EOS

SAFETY MONITORING SYSTEM



Release B JPL DAAC LAN Architecture



 Production FDDI Network
 User FDDI Network

Release B DAAC LAN Architecture



User Network

- Separate network handles only user flows
- Only hosts requiring user access are connected
- Dedicated router interface to users

Production Network

- Switched FDDI-based
 - Combination of dedicated and shared FDDI rings
 - FDDI-to-Ethernet hubs to connect printers and X-terms
- All production data received from EBnet interface

HiPPI (High Performance Parallel Interface) Production Network

- 800 Mbps full-duplex switched (not shared) architecture
- Used for the transfer of large volumes of data between Data Server and Processing hosts at EDC, GSFC and LaRC
- Implementation involves running IP over HiPPI



IP Addressing and Routing

All DAACs use subnetted and whole Class C addresses.

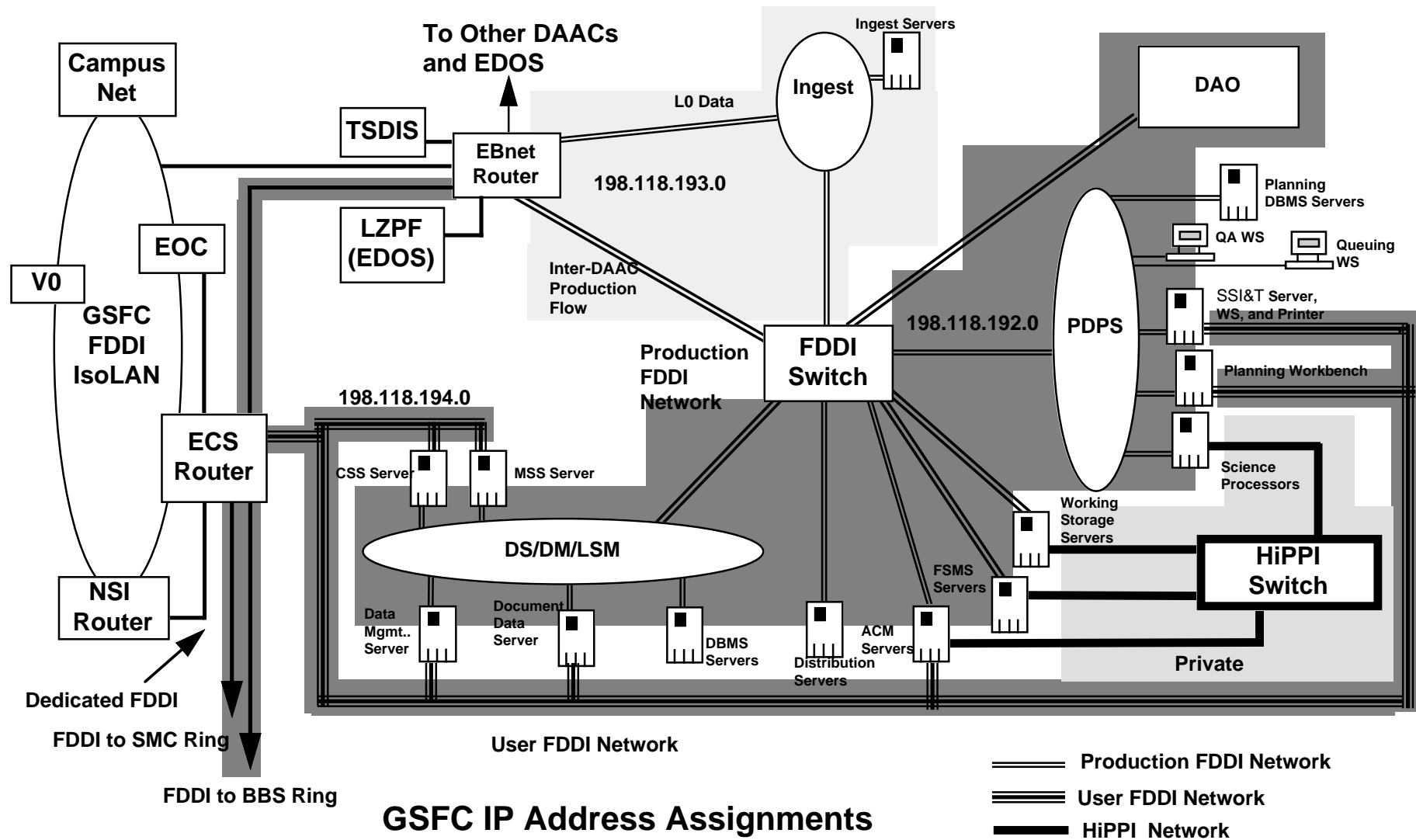
- **GSFC DAAC has been assigned three Class C addresses**
- **All other DAACs will have 2 Class C addresses**
- **The User Network is assigned a whole class C and the Production Network has subnetted Class C addresses**
- **Release A Address assignments have already been made for GSFC and LaRC DAACs**

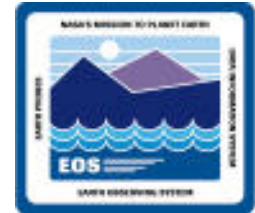
All DAAC Routing will be done using Routing Information Protocol (RIP)

- **RIP will be used for routing within ECS DAAC LANs**
- **Routing between ECS routers and external networks (e.g. EBnet and NSI) will also be via RIP**
- **If NSI requires the use of BGP for route exchanges in the future, ECS routers will be able to support it.**

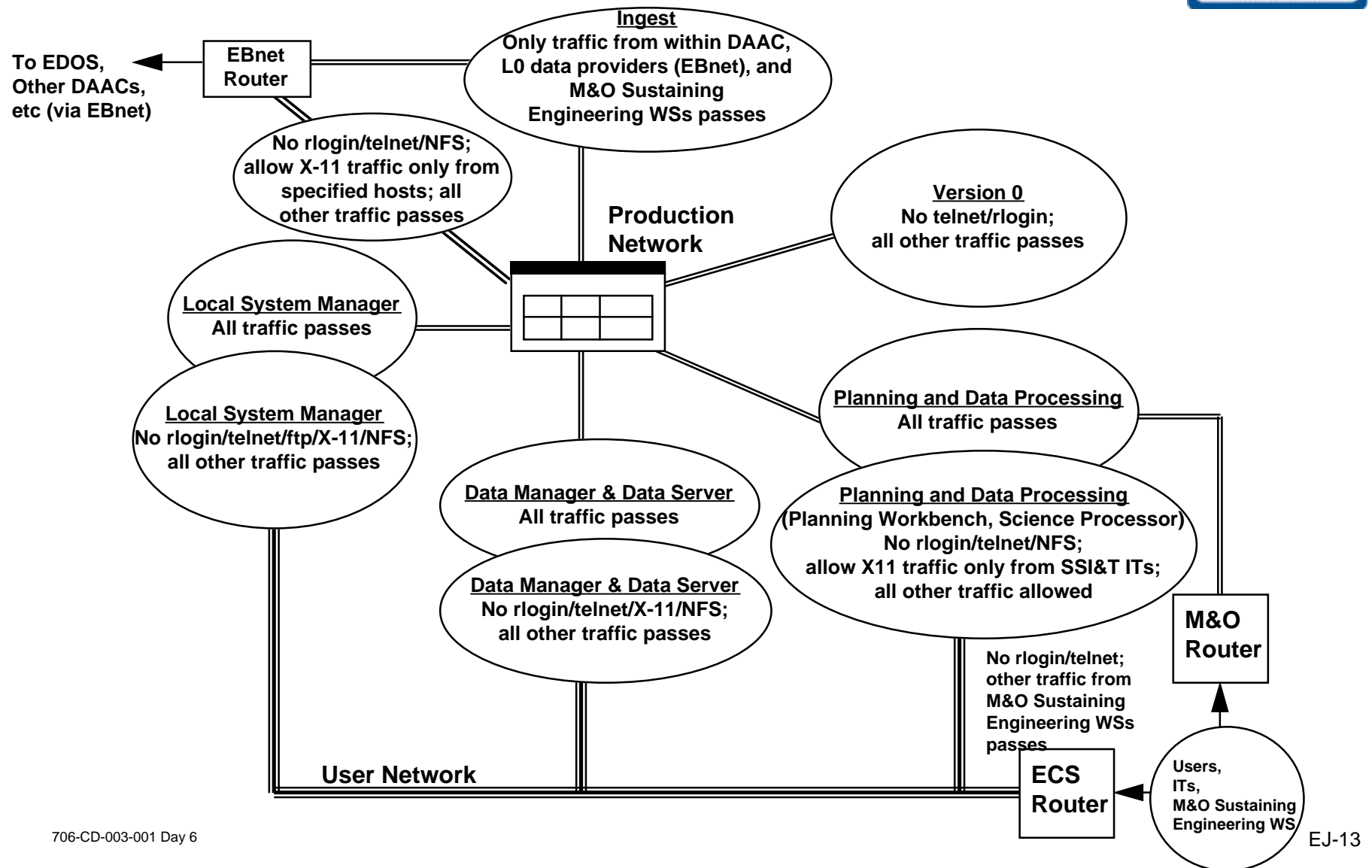


IP Addressing and Routing





Network Security





Failure and Recovery

RMA

- **Central FDDI switch has redundant components (redundant packet engines, fans, power supply) and interface modules are hot swappable**
- **HiPPI switch does not have redundant components but has “semi-hotswapping” capability which uses a simple software command**

FDDI connectivity is such that there is minimal downtime (within RMA constraints)

- **DAS connections for servers on Production network**
 - **the servers are dual homed to separate concentrators**
- **SAS connections for workstations on Production network and servers (separate interface on the same production servers mentioned above) on the User Network**
 - **Workstations/Servers with SAS connections are backed by a peer workstation/server that is connected to a separate concentrator.**

COTS Selections



- **User Network router (no RFP required; vendors already on contract)**
- **HiPPI switch choice recommended to ESDIS**
- **FDDI switch selection**
 - **Alantec PowerHub 7000 and DEC GigaSwitch**
- **FDDI Concentrators (no RFP required; vendors already on contract)**
- **ECS Router (no RFP required; vendors already on contract)**